



# Vermont EMS Today

June 2001

From the Director

## Technology in the World of Vermont EMS

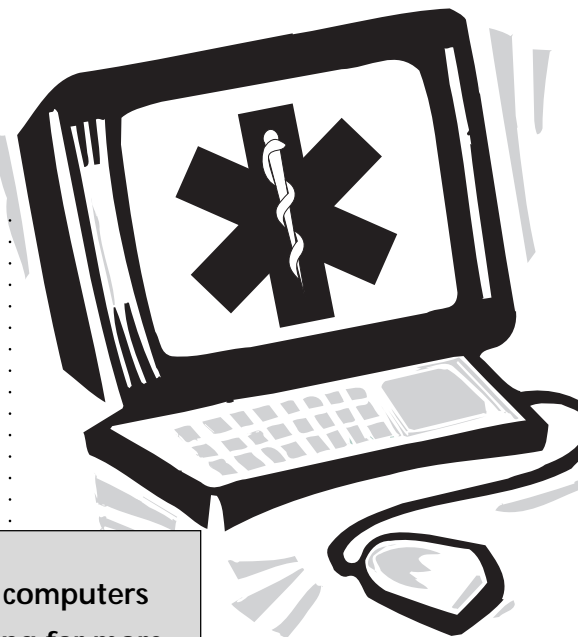
Many of us in EMS are technology junkies. I can still recall my early days in EMS, being amazed at the various tools that are relatively unique to EMS. The work we do is heavily dependent on technologies in the areas of communications, biomedical monitoring, vehicles and other equipment. Even the capacity to gather basic vital signs relies upon the technology in clocks, stethoscopes, and sphygmomanometers.

This past fall, as EMS organizations throughout Vermont were going through the process of renewing their licenses, we asked squads to fill out a survey on several subjects, including the status of

primarily computer and communication based technologies within their organizations. Personal computers are becoming far more commonplace within business and home environments. We were interested in seeing how far down the path EMS organizations were in this same area.

A total of 143 services answered the survey. That number included 80 ambulance services and 63 First Responder Services. The results are reported separately by type of organization.

Personal computers are becoming far more commonplace...



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Technology Type	A*	FR*
Fax capability .....	61	20
Cell phone capability .....	72	7
Squad owned PC without internet ...	29	11
Squad owned PC with internet .....	53	13
Global Positioning System capability .....	8	2
Traffic light control .....	8	2
*A=Ambulances FR=First Responders		

A total of 82 ambulance services and 24 first responder services had computers. The survey asked how and for what purposes they were used.

Function	A*	FR*
Word Processing .....	68	22
Billing .....	40	0
Record Keeping & Data Management ..	67	19
E-mail .....	54	13
Computer Assisted Dispatching .....	10	2
Squad Web site or URL .....	15	2
Officer E-mail capability .....	48	11
*A=Ambulances FR=First Responders		

Vermont EMS organizations are clearly taking advantage of off-the-shelf technology in providing services to patients. In most areas, it appears that ambulance services are using technology more commonly than first responder services.

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# Beyond “Bread and Butter”

All certified providers in this state are well aware that on an annual basis, we must attend continuing education in two areas: mandatory and enrichment subjects. Frankly, the mandatorys sometimes become a bit boring, even though we know that they form the common, critical type of call that we encounter. To be quite truthful, after some of the hair-raising things that I encounter in the enrichment category, I am delighted to return to the doldrums of the commonplace. Two recent actual patient encounters by EMS illustrate my point.

The first patient was a restrained woman passenger riding in the front seat of a vehicle that went out of control and was struck in her door by a vehicle traveling at a high rate of speed. Upon arrival of EMS, a short time after the



crash, she was a “trauma code,” lacking any signs of life. In addition, she had an asystolic reading on the cardiac monitor. As on-line medical direction, I instructed EMS not to initiate a resuscitation or transport. Later, the Office of Chief Medical Examiner’s representative in looking the body over

concluded that the woman was pregnant. Should this fact have mitigated my thinking had EMS discovered it and reported it to me (they hadn’t!)?

The second incident involved a

response of EMS for a woman with severe respiratory distress. Upon arrival by EMS, she seized, went into respiratory arrest which was followed by a cardio-pulmonary arrest in short order. Two defibrillatory shocks were delivered by EMS

with return of a pulse. The gentleman with her advised EMS that she was pregnant. That was all of the information that I had to prepare the emergency department team until one minute prior to arrival of the patient. What preparations do you think might be warranted in this case?

In encountering these patients, everyone should be joining me in the EMS chant of “ABC, IV, O<sub>2</sub>, monitor,” and of course, that would be correct. But what, if any, special considerations attend a pregnant woman aside from these basics and a consideration of displacing the uterus toward the left? (to keep the uterus from compressing the inferior vena cava, thus impeding blood return to mother’s heart.) Especially, at what point in pregnancy might we be able to do an emergency Cesarean Section in an attempt to save potentially both mother and baby (and how soon after arrest of mother must this occur)?

In truth, a pregnancy is unlikely to be viable, under these circumstances

under 28 weeks of development. And, the post mortem C-section must occur within about 15 minutes of mother’s arrest. With each passing minute, the likelihood of a good outcome declines. We begin to see the importance of the actions taken and information gleaned at the scene.

In the case of the car crash, mother was in arrest and extrication was still in progress. Travel time, once loaded into the ambulance, would be 20 minutes or more to the trauma center. Irrespective of how far along the pregnancy was, emergency C-section was not a viable option. The correct call had been made,

but the all important “take home message” was: we must think about pregnancy and make inquiry early on if there is any chance at mitigating the outcome.

In the case of the woman who had seized then arrested and was impending to the ED, I

pulled out all of the stops in preparation for her arrival. In the absence of the information that EMS could likely have provided earlier, I had a team ready to deal with the mother and I had separate teams ready to perform an emergency Cesarean Section and resuscitate the newborn.

In fact, mother was not pregnant and did quite well. The teams assembled in the resuscitation room were all very glad to have had a “dry run” reminder of this important consideration. Because of the experience, we are in a much better position to do our best should the opportunity again present itself.

Some “take home” issues for EMS: 1) Ask about pregnancy and attempt to determine how far along the pregnancy is (and make relevant observations), and 2) Present that information to the receiving hospital as soon as possible. If we are ever going to make a difference, we will have to marshal some forces in a timely fashion.

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## Vermont EMS Today

is published as a service for Vermont’s emergency medical providers. Suggestions, comments and news items are always welcome. Write or call Leo J. Grenon, Vermont Dept. of Health, 108 Cherry Street, Box 70, Burlington, VT 05402. (802) 863-7310 or 1-800-244-0911 (in Vermont only). Email: VTEMS@VDH.STATE.VT.US

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This publication can be obtained in other forms: 1-800-244-0911, 1-802-863-7310; ask for Leo Grenon. If you want to reprint articles from this or any Vermont EMS Today publication, please contact Leo Grenon at the above numbers.

From the Director—

# Technology in the World of Vermont EMS

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**Fax capability:** About three-quarters of all ambulance services and a third of first responder services have fax capability. For the first responder services, this appears to be a reflection of how the squad is housed rather than the use of the technology.

**Cell phones:** This technology has become almost universal for ambulance services. Cell phones provide the opportunity for an alternative route of communication with the hospital other than by two-way radio. They also allow contact with any resource reachable by phone from the field. The obvious downside of cell phones is that there continue to be significant areas of the state that do not have good cell site coverage. With the recent introduction of digital cellular service to VT, the capacity to provide new and different services appears promising.

**Squad-based personal computers:** PCs are now in most ambulance stations. Interestingly, nearly two-thirds of those computers are connected to the internet. Internet capability may take on additional importance in the future as the vehicle for our developing statewide system to move data from point to point. Not surprisingly, fewer than half of first responder services have PCs. Many of the first response organizations that do not have PCs are groups that typically do not respond from a single station or other fixed location.

The squads that have computers are using them for multiple functions. Most do the basic chores of word processing, information management, and e-mail. Only half of the ambulance services with computers use them for billing purposes. This may be a reflection of the number of squads that use an outside billing service.

Further down the list of computer use is computer assisted dispatching and hosting a squad website or Uniform Resource Locator.

More exotic technologies such as Global Positioning System devices and traffic light control systems are beginning to appear in Vermont EMS organizations. Only a handful of organizations are using these technologies, which is probably a reflection of both local needs and local resources.

Owning technology for the sake of having it is probably of little value. Vermont EMS organizations appear to be acquiring technology that is useful in supporting the patient care delivery of individual squads. The information contained in this article may help squads evaluate their own technology standing in comparison to others. The consideration of technology deployment should be part of the routine planning effort of every EMS organization.

— Dan Manz, Director

From the Medical Advisor—

# Beyond “Bread and Butter”

CONTINUED FROM PAGE 1

Emergency post-mortem Cesarean Sections have been described in the literature as potentially offering a better potential for survival of both mother and baby under a variety of trauma and medical emergencies. While quite uncommon, they offer a tremendous challenge at saving potentially two lives in one intervention. Only with the entire team working in concert from the time of EMS activation can we hope to influence the outcome.

We must be mindful that a woman of childbearing age might be pregnant. We must make respectful inquiry about the possibility. Our physical exam of the abdomen must particularly note the size of the enlarged uterus (eg. number of centimeters above the pubic symphysis or distance below the umbilicus). We should be prepared to estimate our safe

travel time to the ED and communicate dynamically with medical direction to deliver the best outcome.

Each year, we review the mandatory subjects. They are our “bread and butter.” Truthfully, I would rather have one of those than the potential reality of an emergency post-mortem Cesarean Section. In consideration of this, I am delighted to go back to backboarding and splinting and I remind myself of the pivotal role EMS plays in the healthcare team. The topic of obstetrical emergencies is a worthy area of review to enrich the lives of all whom we treat.

When the call for EMS is other than our “bread and butter,” I expect that we will close ranks in the most affirmative way—and that the outcome will be our best.

—Wayne Misselbeck, M.D.  
State EMS Medical Advisor

## Toll-Free Number

*Save yourself some money.*

When calling  
EMS from  
within Vermont,  
use our toll free  
number:

**1-800-244-0911**



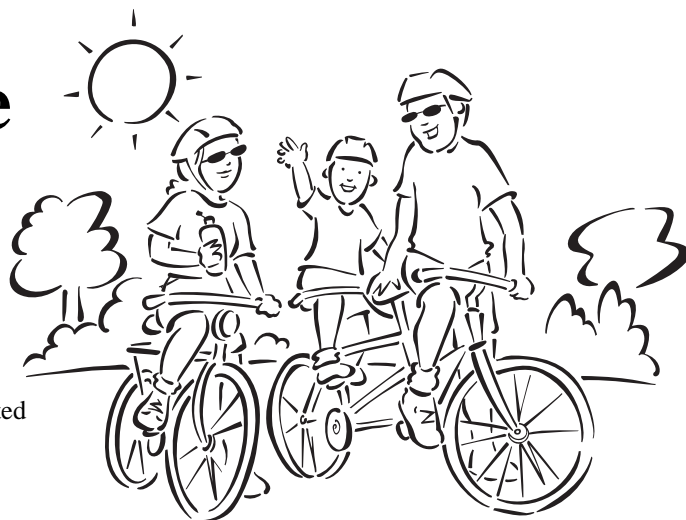
EMS  
Fax Number  
**1-802-  
863-7577**

Email

**VTEMS@VDH.STATE.VT.US**



# Play Hard, but Play Safe



In Vermont, we earn our summers! After a long, cold winter, we deserve every warm day we get. Unfortunately, warm weather has its consequences. When you venture outside to pursue your favorite recreational pastimes, remember this: summer is trauma season. Our favorite activities can easily become opportunities for injuries.

There are many important summer safety topics to bear in mind. Here are two:

## Foot-Powered Scooters

Have you seen the latest generation of scooters? These little speed machines are made of polished metal with inline skate wheels and folding handlebars. They are very fun and very popular. In fact, experts in this industry have estimated that approximately 5 million scooters will be sold this year.

As you may have guessed, EMS and hospital personnel have seen an increase in scooter-related injuries involving children and teenagers (according to the Consumer Product Safety Commission). Fortunately, most of these injuries are preventable. Consider the following suggestions when supervising children and teens on scooters:

- DO wear a helmet, elbow pads and kneepads. Be sure that these safety devices fit and are worn correctly.
- DO ride during the day. Small potholes, stones and other hazards may not be visible at night.
- DO ride on smooth, dry surfaces only. Wet surfaces and surfaces containing patches of sand or gravel may cause the rider to lose control of the scooter.
- DO NOT allow more than one person to ride on a scooter.
- DO NOT wear wrist guards. Wrist guards are great for skating and skateboarding, but they are not well-suited for scooters. Wrist guards may interfere with the rider's ability to properly grip the handlebars. As an alternative to wrist guards, consider wearing a pair of rugged bicycling gloves. Bicycle gloves may offer some extra protection without

compromising the rider's grip on the handlebars.

- DO NOT ride in areas with automobile traffic. Restrict riding to parks and other areas designated for recreation. Simply stated, automobiles and scooters can be a deadly combination.

The most common injuries caused by scooters are minor cuts and bruises. Still, you should be on the lookout for more serious injuries such as fractures, dislocations and head injuries. Consider a scenario in which the rider falls off the scooter, landing on the hands with arms extended. In this case, you might expect to see fractured wrists as well as dislocated shoulders and/or clavicular fractures. As with any traumatic injury, carefully assess the head, neck and back.

Make a note of any safety equipment the rider may have been wearing (elbow/knee pads, helmet, etc.). Bring this equipment with you to the hospital, as it may be useful in determining the location and extent of the injuries.

The Consumer Product Safety Commission (CPSC) maintains a list of recalled and unsafe products. If you feel a faulty scooter might have caused an injury, you can report the incident to the CPSC via their website (<http://www.cpsc.gov/>).

## Lightning Safety

Lightning strikes the earth as many as 5 million times each day. Fortunately, the great majority of these strikes do not harm people or property. Nevertheless, each one of these flashes is an opportunity for tragedy. Consider the following safety suggestions:

**Plan Ahead:** If you are coordinating an outdoor event, keep an eye on the weather. If you can see lightning or hear thunder, you should ask everyone to seek shelter. Lightning often strikes ahead of

**Fortunately,  
most of these injuries  
are preventable.**

the rainstorm, so DO NOT wait until the storm is above you before you seek shelter. Only substantial buildings (like schools, businesses, homes) should be used

as lightning shelters. A car with its windows rolled up is also an effective lightning shelter. Small picnic shelters and other small structures will not protect you from lightning. Do not venture outside again until at least one-half hour has passed since the last sign of thunder or lightning.

If you cannot seek shelter: Try to avoid high ground and open spaces. Stay clear of metal objects like fences, metal bleachers, etc. Avoid standing near trees. If lightning is striking nearby, crouch down with your feet together and cover your ears to avoid hearing damage due to thunder. Stay at least 15 feet away from other people, as ground strikes can cause electrical arcing between two people.

**Water and Lightning:** At the first sign of thunder or lightning, all swimmers should immediately evacuate the water (even when using an indoor pool) and seek shelter. Swimmers should stay out of the water until at least one-half hour has passed since the last sign of thunder or lightning.

If you are called to assist a patient who was struck by lightning, your first priority is to avoid being struck yourself. Remember to treat lightning with the same caution you would use for any other scene hazard.

Do not worry about being shocked by a patient who was struck by lightning. Our bodies DO NOT retain an electrical

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charge after a lightning strike.

If your patient was struck by lightning directly, you could expect to see major burns and tissue damage near the head and shoulders, as lightning usually enters near the top of the body. The lower extremities may have been burned as the electricity exited the body. Deep tissue burns will be present anywhere between the entrance and exit points.

In many cases, a patient may be struck by lightning indirectly. Lightning can travel through the ground and then enter the body through one leg and exit through the other, damaging tissues along its path. The chances of this happening are smaller when the person is standing with both feet together. The farther apart the feet, the more likely it is that electricity will enter the body from the ground. This explains why livestock are particularly susceptible to lightning strikes. It is hard to teach a cow to stand with all four legs together!

When assessing your patient, be on the lookout for orthopedic injuries. Bones can be broken either as a direct result of the lightning or as a secondary injury if the patient is thrown. Injuries to the neck and back are also possible, so consider the need for immobilization on a spine board.

Another common result of lightning strikes is cardiac arrest. Fortunately, the heart will often begin beating on its own shortly after the strike. However, the patient's respiratory system may be paralyzed for quite some time. This means that the patient has a reasonable chance of survival if CPR is started quickly. After a few rounds of CPR, the heart may begin beating again. However, the patient will probably still need assisted ventilations.

Since lightning strike victims in cardiac arrest have a good chance for survival, you may want to revise your triaging practices for MCIs involving lightning. If you are called to an incident involving multiple patients struck by lightning, it is wise to perform CPR on patients in cardiac arrest.

As you venture outside this summer, remember to play hard, but play safe!

Wishing you a season of sunshine,

— Bill Clark

*Pediatric EMS Coordinator*



## The Vermont EMS Data Project Update

As many of you know, the Vermont EMS Office is coordinating the development of a statewide EMS data collection system. We plan to provide you with regular updates on this project through this newsletter and via our webpage ([www.state.vt.us/health/ems](http://www.state.vt.us/health/ems)).

On April 23, the Vermont EMS Data Collection Task Force held its second meeting. We focused most of our time on output reports and data elements. Our goal is to develop a list of data points that each EMS agency will collect during an EMS incident. The data set is designed to provide us all with meaningful reports about injury trends, protocol effectiveness, demographic information and EMS management.

This summer, some of our task force members will visit several other states to learn about their EMS data collection systems. By carefully analyzing how other states collect EMS data, we will be better prepared to complete our own data project. Fortunately for us, many states have already been through the trials of EMS data collection implementation. We hope to learn from the mistakes and successes of these states.

Over the past few weeks, several EMS agencies have contacted me to

request information on starting an in-house data collection system for their service. It's great to see that many agencies have come to understand the value of EMS data. I would encourage anyone who is interested in creating an in-house data system to contact me. There are many things to consider when starting such a program. For example, which hardware/software will you use? What will you use as your data set? Will your program be compatible with the statewide system under development?

I would like the opportunity to talk with anyone who is interested in EMS data. I may be able to provide you with resources and information to help you meet your data needs. Please feel free to contact me either by e-mail ([wclark@vdh.state.vt.us](mailto:wclark@vdh.state.vt.us)) or by calling the VT EMS Office.

— Bill Clark

*Pediatric EMS Coordinator*

Number of people holding Vermont EMS certification as of 4/1/01:	
ECA	814
EMT-Basic (does not include advanced levels)	1390
EMT-I	833
EMT-P	81
<b>Total EMTs at all levels:</b>	<b>2,304</b>

MARK YOUR CALENDAR!  
**2002 EMS Conference**

April 6 & 7



Preconference  
April 4 & 5



## EMS Instructor Course

Sixteen students completed the EMS Instructor Course on March 4 at the University of Vermont in Burlington. Participants once again finished the course with a sense that they had learned a great deal about teaching and learning. With ten of Vermont's thirteen EMS districts represented in the class, these new graduates will be able to assist many districts in meeting the educational needs of their providers. Our thanks go to Joanne Lebrun and Greg Thweatt for teaching another wonderful course and to Pat Malone, who coordinated the course through the Initiative for Rural EMS at UVM.

The next course is anticipated to begin in January of 2002. Anyone interested in registering for it should contact his or her district chair or training coordinator.

### Graduates of Spring 2001 EMS Instructor Course:

Brian Anderson  
William Buckley  
Mark Camara  
Steve Chambers  
Theresa Conant  
Andrew Cook  
Mary Donati  
John Hannon  
Bea Larramie  
Brian Leake  
Chris McCarthy  
Kathy McLean  
Tom Numann  
Mark Onyon  
Robert Robishaw  
David St. Pierre



## On-Line Resources

The Brain Trauma Foundation has guidelines for the pre-hospital management of patients with brain injuries at [braintrauma.org](http://braintrauma.org). This includes information on recently revised recommendations regarding hyperventilation of patients with head injuries. Go to the guidelines section of the site to download the document.

The Health Information Portability and Accountability Act (HIPAA) is a new federal law with far-reaching implications for healthcare providers of all types. The intent of the law is "to protect and enhance the rights of consumers by providing them access to their health information and controlling the inappropriate use of that information; to improve the quality of health care in the U.S. by restoring trust in the health care system among consumers, health care professionals, and the multitude of organizations and individuals committed to the delivery of care; and to improve the efficiency and effectiveness of health care delivery by creating a national framework for health privacy protection that builds on efforts by states, health systems, and individual organizations and individuals." The rules implementing this law are long and complex, so it will be some time before they are fully understood. They apply to health care agencies that transmit patient information electronically to another organization, e.g., an ambulance service and its billing agency. You can get more information at [www.aspe.hhs.gov/admsimp](http://www.aspe.hhs.gov/admsimp).

Our thanks go to  
Joanne Lebrun and  
Greg Thweatt for  
teaching another  
wonderful course  
and to Pat Malone, who  
coordinated the course  
through the Initiative for  
Rural EMS at UVM.

You can check on the status of the National EMS Research Agenda at [www.researchagenda.org](http://www.researchagenda.org). This document identifies obstacles to EMS research and suggests solutions to these problems. You can download the latest draft of the agenda there.

## EMT-Intermediate Curriculum

Progress continues on the work of adapting the new national standard EMT-Intermediate curriculum for use in Vermont. A meeting with district medical advisors and a follow-up survey have clarified significantly many of the interventions district medical advisors feel are medically sound and should be included. After the list of interventions is complete, EMS Office staff will meet with district and other officials to consider how much of the medically acceptable material is feasible and reasonable in Vermont. For more information, see the article "Upcoming Changes in the EMT-Intermediate Curriculum" in this issue.

— Mike O'Keefe  
State Training Coordinator

# Welcome Aboard Steve Salengo

The Vermont EMS Office is pleased to introduce Steve Salengo as our newest staff member. Steve joins us as our EMS Operations Coordinator, the position previously held by Rob Schell who transferred to Vermont's Emergency Management Office.

Steve is an EMT-Intermediate and has a variety of experience working with Regional Ambulance Service of Rutland and their Castleton First Responders, Fair Haven Rescue, Poultney Rescue, and White River Valley Ambulance in Randolph. In addition to EMS activities, Steve has a background in law enforcement and is currently an assistant medical examiner.

Most recently, Steve held the position of academic counselor for Castleton State College. In that position he worked primarily with "at risk" students to resolve academic and other issues.

Steve has a strong background in several EMS related areas including trauma care, vehicle extrication, mass casualty management, and BCLS training. His diverse background will be useful in the technical assistance that his position commonly provides for EMS personnel and organizations.

One of Steve's early tasks will be touring all Vermont ambulance services to perform ambulance inspections. Please join us in welcoming him to the Vermont EMS team.

## Enhanced 9-1-1 Board

**9-1-1**  
FOR EVERYONE

Enhanced 9-1-1 Board has moved to the Capital Plaza, 94 State Street, 4th Floor, Montpelier, VT 05620. Telephone and fax numbers are still toll free in Vermont 800-342-4911 or 802-828-4911 and fax number is 802-828-4109.

## 9-1-1 Addresses

The Enhanced 9-1-1 Board would like to remind all departments that the information call-takers give to your dispatchers is the best information that can be gathered from the caller. If you are sent to an address that turns out to be wrong—tell 9-1-1. You can contact the PSAP where the 9-1-1 call was answered or contact the Board directly at 800-342-4911. The 9-1-1 database can't be corrected if errors aren't pointed out.

## Call-Taker Training

The Enhanced 9-1-1 Board schedules training for their call-takers and any service responder and dispatcher in the state is welcome to attend. This year they are offering new programs about terrorism, school violence, and nuclear-biological-chemical (NBC) threats. These classes are geared to the people who answer the phones, but there is always a lot of information about what happens at the scene. There is no charge to attend these classes and they are held at different locations around the state. If you would like a schedule, contact Sarah Ferris at the Vermont Enhanced 9-1-1 Board, 94 State St., Montpelier, 800-342-4911 or send e-mail to [ferris@e911.psd.state.vt.us](mailto:ferris@e911.psd.state.vt.us).

## 2001 EMS Award Winners!

*Again we congratulate our 2001 EMS Award Winners! We salute as well all our EMS pre-hospital care providers for a job well done.*

*—Dan Manz, EMS Director*

Leader of the Year  
**Jay Wood**  
*Caledonia Essex Area Ambulance  
Service, Inc.*

First Response Agency  
of the Year  
**Middletown First Response Squad**

Nurse of the Year  
**H. Dale Porter, R.N.**  
*Copley Hospital*

Physician of the Year  
**Richard Marasa, M.D.**  
*Springfield Hospital*

First Responder of the Year  
**Clinton Jackson**  
*Wallingford Rescue, Inc.*

EMT-Intermediate of the Year  
**Heidi Wood**  
*Williston Rescue*

Educator of the Year  
**Patricia Edwards**  
*White River Valley Ambulance*

EMT-Basic of the Year  
**Cheryl Estey**  
*Starksboro Emergency Rescue Unit*

EMT-Paramedic of the Year  
**James Collins**  
*Regional Ambulance Service*

Ambulance Service of the Year  
**Charlotte Volunteer Rescue  
Squad**

Vermont SAFE Kids Injury  
Prevention Award  
**Catherine Clark**  
*Northfield Ambulance Service*

# Upcoming Changes in the EMT-Intermediate Curriculum

Determination of the medical content of Vermont's next EMT-Intermediate curriculum is almost complete. District medical advisors have discussed and considered a large number of interventions included in the 1999 national standard EMT-Intermediate curriculum. In considering factors such as anticipated frequency of use, the need for significant clinical exposure in initial education, and skill maintenance, the medical advisors selected some interventions for inclusion and some for exclusion in Vermont's next EMT-Intermediate curriculum.

The first step in determining the medical content of the curriculum was consideration of the interventions by district medical advisors. The next step is to evaluate the practicality of including these interventions. District and other officials will have an opportunity to participate in this process. Once that is complete, the content will be converted to a curriculum, which can then be taught to existing EMT-Intermediates and new students.

## Interventions likely to be included

All of the interventions in the current curriculum will continue to be included in the new curriculum, with the exception of the Esophageal Obturator Airway (EOA). If the pilot project for the Esophageal Tracheal Combitube is successful, this device will replace the EOA. Other skills retained from the traditional Vermont version of the course will include phlebotomy, peripheral intravenous access, intravenous 50% dextrose and naloxone, and subcutaneous 1:1,000 epinephrine for anaphylaxis.

New interventions (see box) are expected to include pulse oximetry, blood glucose analysis, beta agonists administered by inhalation, aspirin administered orally, nitroglycerin administered sublingually, thiamine and glucagon administered intramuscularly, and use of a Broselow® or similar tape for pediatric patients. Each of these interventions brings with it certain benefits and risks, advantages and disadvantages. What follows is a brief description of these characteristics. Keep in mind this is a tentative list. It is subject to change, based on further discussions with district medical advisors and other district officials.

### INTERVENTIONS LIKELY TO BE INCLUDED

#### *Retained from Current Curriculum*

- phlebotomy
- peripheral intravenous access
- intravenous 50% dextrose
- intravenous naloxone
- subcutaneous 1:1,000 epinephrine for anaphylaxis
- Esophageal Tracheal Combitube® in place of the EOA

#### *New Interventions*

- pulse oximetry
- blood glucose analysis
- beta agonist administered by inhalation
- aspirin administered orally
- nitroglycerin administered sublingually
- thiamine and glucagon administered intramuscularly
- use of a Broselow® tape for pediatric patients

## Blood Glucose Analysis

One of the most important tools in the prevention of complications from diabetes is the portable blood glucose monitor. Knowing a patient's blood sugar level allows the caregiver and patient to modify treatment and behavior accordingly.

### BENEFITS AND ADVANTAGES

Modern blood glucose monitors are portable and accurate. Properly used, they can be invaluable in differentiating, for example, the diabetic patient having a stroke from the diabetic patient having a hypoglycemic episode. Although EMTs were taught in the past that it is harmless to give sugar to someone who doesn't need it, this belief has recently been questioned. When high blood sugar levels were found in head injury patients who did poorly, no one could answer the question: Is the hyperglycemia a cause or an effect of the poor outcome? Since there is currently no definitive answer to this question, healthcare providers have become more cautious in administering glucose.<sup>1</sup> Stroke patients are in a similar position because of their similarity to head injury patients and the lack of evidence regarding benefit and harm. Blood glucose monitoring has helped prevent unnec-

essary glucose from being administered and, in a few cases, led to the administration of glucose to a patient not initially thought to be hypoglycemic.

### RISKS AND DRAWBACKS

Like any machine, a glucose monitor is not perfect. It has a margin of error that is small as long as the device is used and maintained properly, including regular calibration checks. Even so, the device does not relieve the provider from the need to exercise clinical judgment. Good assessment skills are a critical part of using any patient monitoring device.

A lancet used on a finger or venous blood from a venipuncture is the typical means of getting a blood sample for analysis. In either case, there is a small risk of a needle stick.

Although the device is simple to operate in many ways, it is not foolproof. The proper technique must be used to place the blood on the reagent stick. The battery must not be allowed to run down. Reagent sticks must be stored properly and used or discarded before the expiration date on the package.

Because the steps of obtaining and analyzing a blood sample take time, there is the potential for inappropriate delay of transport.

Any EMS organization using a blood glucose monitor must comply with the Clinical Laboratory Improvement Amendments (CLIA). This federal law requires all laboratories (including mobile ones, e.g., ambulances) to meet certain standards of quality.<sup>2</sup> Fortunately, blood glucose measurement is on a list of waived tests. Because these waived tests are relatively simple, an organization conducting them can get a waiver that allows the agency to do the tests without meeting all of the requirements of CLIA. The waiver costs \$150.00 and is good for two years. Failure to comply with CLIA regulations can lead to revocation of the EMS agency's ability to bill Medicare and even demand for repayment of previous Medicare funds.

### SUMMARY

Blood glucose measurement has the potential to assist EMS providers in administering glucose to patients who need it and

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refraining from administration of glucose to patients who might be harmed by it. Maintenance of the device and adherence to CLIA standards are essential if it is to be used.

## Pulse Oximetry

Oxygen saturation monitors used to be large, expensive, heavy devices that were used only in hospitals. Recent years have seen an explosion in the number of smaller, lighter, less expensive machines that many EMS providers use throughout the country. This device allows a provider to quickly and noninvasively obtain a measure of the proportion of the patient's blood that is loaded with oxygen.

### BENEFITS AND ADVANTAGES

The primary benefit of pulse oximetry is early notification of hypoxemia. Cyanosis is an obvious but very late sign of hypoxemia, and other signs can be subtle and difficult to detect. A device that gives a warning before the patient deteriorates can be very useful.

Some providers have also found the device very helpful in detecting impairment of peripheral circulation. Attaching the probe distal to an injury on an extremity will alert the provider that a potential problem has occurred when it no longer gives a reading. Since the probe depends on adequate perfusion to give an accurate reading, this can be an early warning of diminished circulation.

### RISKS AND DRAWBACKS

Although a pulse oximeter is less expensive now than a few years ago, it can still be a significant investment for a small service with limited revenues. Low price is no guarantee of a bargain and high price is no guarantee of value. Anyone considering purchase of a pulse oximeter should investigate the matter carefully and consult medical direction.

Like every mechanical device, the pulse oximeter has limitations. The probe in the pulse oximeter evaluates oxygen saturation by evaluating the frequency (color) of the light received. Carbon monoxide poisoning, therefore, will lead to a falsely high reading. An oxygen saturation of approximately 92% or greater is considered normal, but a reading in this range is not always an indication of adequate oxygenation (PaO<sub>2</sub> greater than or equal to 60 mm mercury).

Any prehospital provider who has used a pulse oximeter for any length of time can describe frequent false alarms. The most frequent cause of a low reading in the field is a problem with the probe detecting a signal, not a patient becoming hypoxic.

One of the risks with any mechanical assessment device is that it will distract the provider from the patient. This is a well known phenomenon with EKGs: when the EKG monitor starts printing out the patient's rhythm, it seems all eyes turn away from the patient and toward the strip. Use of any such monitoring device requires EMS providers to assign priorities appropriately, keep in mind each crew member's role and maintain proper focus.

An example of this kind of problem appeared in a training video provided by a pulse oximetry manufacturer several years ago. The simulated crew responded to an unresponsive trauma patient. The first thing they did was attach the pulse oximeter. After a short pause, the machine displayed a low oxygen saturation reading. The crew then decided to open the patient's airway and administer oxygen, the exact opposite of what should have occurred.

Some people feel that when they have a number to describe a condition or severity, there is more "objectivity" to the assessment and so more reliability. This sometimes leads to ignoring other information and relying entirely on one assessment parameter. This is dangerous and should be avoided. Good assessment requires a provider to evaluate a number of factors, determine which are important, and draw a conclusion based on all of the available information. Relying on one single measure can lead to erroneous conclusions, especially when that measure is subject to error.

When EMTs are ventilating a patient, knowing whether a patient is hypoxic can be very useful information. Unfortunately, this is when pulse oximetry is least useful because the patient frequently does not have enough perfusion for the machine to get an accurate reading.

Strangely enough, pulse oximetry has not been shown to improve survival, even in

large trials (e.g., more than 20,000 Danish surgical patients<sup>3</sup>). This is puzzling, given the paramount importance of airway and breathing. Is pulse oximetry really providing important, accurate information or is it just giving us information that makes us feel better without actually provid-

ing any measurable benefit to our patients? This question is especially important in EMS systems. If EMTs are not giving hypoxic patients oxygen, there are two questions to answer: are the patients truly hypoxic and, if so, do the EMTs need a pulse oximeter or better training?

## SUMMARY

Despite the lack of evidence to support its use, pulse oximetry has become a standard device in advanced life support systems. It has also become a skill EMT-Basics perform frequently around the country.<sup>4</sup> Properly used, the device has the potential to alert EMS providers to the early development of hypoxemia. Improperly used, it can distract providers from the patient and interfere with patient care.

## Beta Agonist Administered by Inhalation

Without question, one of the medications prescribed most often today is the albuterol inhaler. Asthma, or reactive airway disease, is a common health problem and one that has seen an alarming increase in mortality in recent years. Albuterol is a potent bronchodilator with fewer and less severe side effects than previously used asthma medications.

### BENEFITS AND ADVANTAGES

Albuterol and oxygen are the medications of first choice for acute treatment of bronchospasm secondary to asthma. It usually relieves shortness of breath quickly and lacks the uncomfortable and occasionally dangerous side effects of older medications traditionally used for this condition. It has the additional advantage of being inexpensive (approximately one dollar per dose) and easy to administer.

### RISKS AND DRAWBACKS

Although albuterol works very well for asthma, it is **not** the drug of choice for some other conditions characterized by difficulty breathing. Although experienced providers can usually tell the difference between dyspnea from asthma, congestive heart failure (CHF), exacerbation of chronic obstructive pulmonary disease and pneumonia, this is not always an easy determination to make,<sup>5,6,7</sup> especially when the person making that decision has limited familiarity with these diseases. There is some recent research suggesting increased mortality in cardiac patients treated with albuterol.<sup>8</sup> An EMT-I's assessment skills will need to be more sharply attuned for dyspnea patients so that patients get the proper treatment.

Another concern is potential delay of transport. If an EMT-I has no definitive treatment for a patient, but delays transport to administer a medication that will not help, the patient may suffer because of delayed hospital treatment.

An unanswered question is how often albuterol is needed in the field. The increase

**Low price is no guarantee of a bargain and high price is no guarantee of value.**

in asthma deaths is primarily an urban phenomenon and not thought to be a common problem in Vermont.

## SUMMARY

With a strong safety profile, albuterol has few risks from its appropriate administration. If EMT-Is are going to administer albuterol, they will need to be more familiar with different causes of shortness of breath, something that will require additional classroom as well as clinical time.

## Aspirin

Aspirin used to be considered just a good medication for relieving pain and reducing fever. We now know that it is truly a wonder drug with an important application in the treatment of patients with myocardial infarctions (MI). It is one of the most cost-effective drugs available today.

## BENEFITS AND ADVANTAGES

Because aspirin has strong anti-clotting activity, it is very useful in patients with clots blocking the coronary arteries. Aspirin has been shown to cut mortality from MI by as much as 25%, as much as more expensive and more risky thrombolytic drugs. When the mortality rate from MI was compared at the "best" hospitals in the U.S. and other hospitals, almost all of the improvement in mortality was accounted for by the consistent administration of aspirin and another relatively inexpensive drug (beta blockers).<sup>9</sup>

## RISKS AND DRAWBACKS

To administer aspirin safely, EMT-Is will need to place significantly more emphasis on a part of assessment that has had little direct applicability in field care at this level up to now: evaluating a patient for allergies. A small but significant number of patients are allergic to aspirin or other nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen. Giving aspirin to such a patient might lead to a life threatening anaphylactic reaction.

The patient's past medical history also takes on new importance under these circumstances. Giving aspirin to a patient with a history of peptic ulcer disease or gastrointestinal bleeding could be dangerous to such a patient.

Another concern related to assessment is the rare, but not unheard of, condition known as a dissecting thoracic aortic aneurysm. A patient with an aneurysm has a weak spot in the side of an artery that allows the walls of the vessel to separate and bulge out, like a bicycle tire with a weak spot. The chief complaint of a patient with this condition is typically excruciating chest pain. This condition is associated with limited survival; administering aspirin to this patient would de-

crease significantly the already small chance of survival.

An unanswered question about aspirin is when it has to be administered. We know that intravenous thrombolytics need to be given within hours of the start of an MI to have maximum effect. There is a common but unproven belief that aspirin works better when it is given earlier. But in a study of the effects of aspirin and thrombolytics on MI in more than 17,000 patients, aspirin administered between the fifth and twelfth hours was just as effective as aspirin administered in the first four hours.<sup>10</sup> No studies to date have evaluated the effect of prehospital aspirin compared to in-hospital aspirin.

## SUMMARY

Aspirin is a potentially lifesaving drug for patients experiencing myocardial infarctions. There is no evidence it needs to be given extremely early, but it has become a commonly administered paramedic medication. As long as the patient is properly assessed and the provider has sufficient experience and good judgment to refrain from giving it to patients who might be harmed, it has the potential to help some prehospital patients.

## Sublingual Nitroglycerin

Nitroglycerin is another medication that is well-known and widely used. It is frequently prescribed to patients with angina, a condition where the coronary arteries are unable to supply sufficient oxygenated blood to the heart muscle. This results in the classic crushing or squeezing pain across the chest. Because nitroglycerin dilates blood vessels and reduces the amount of blood returning to the heart, it typically relieves anginal pain.

## BENEFITS AND ADVANTAGES

Nitroglycerin, oxygen and rest are the three classic interventions that relieve the pain of angina. EMT-Is already administer oxygen and encourage patients with this kind of pain to rest. Adding nitroglycerin to their armamentarium will allow them to relieve chest pain and anxiety more frequently.

## RISKS AND DRAWBACKS

Sublingual nitroglycerin, when administered for chest pain, does not save lives. This is not to say nitro is without value. Relieving pain and anxiety are very important functions of EMS providers. The risk, however, must be borne in mind when administering any intervention like this.

One of the biggest risks is from a drug interaction. A patient who has taken sildenafil (Viagra®) and then takes nitroglycerin is at significant risk for life-threatening hypotension<sup>11</sup>. EMT-Is who administer nitroglycerin will need to be vigilant in asking about prior

medication administration and in considering drug interactions. Although sildenafil is approved for use by males, women have been known to take it also. The physiological actions of this drug apparently produce in some women effects that are similar to what men experience.

Storage of nitroglycerin can be problematic. Since nitro tablets degrade quickly in the presence of light and moisture, the preferred form of nitroglycerin for EMS use is the spray canister. One canister containing 200 doses costs approximately \$25.

Approximately 1.3 percent of EMS patients receiving nitro for the first time will experience adverse effects.<sup>12</sup> This may seem like a small proportion, but that means one out of about every 75 patients will experience significant hypotension, profound bradycardia or asystole. If 1000 patients received nitroglycerin in the field in one year, that means about 13 would experience one or more of these effects. EMT-Is, if they administer this drug, will need to be vigilant in their ongoing assessment of these patients, especially with regard to blood pressure. They will also need to be highly skilled in the management of this type of hypotension.

Nitroglycerin has been found in at least one study to improve survival in critical prehospital patients with congestive heart failure or pulmonary edema.<sup>13</sup> There was no benefit for patients who were not critical. Patients whose final diagnoses were asthma, chronic obstructive pulmonary disease, pneumonia, or bronchitis, though, had a higher than expected mortality rate if they received treatment for congestive heart failure.

## SUMMARY

Administration of nitroglycerin by EMT-Is has the potential to relieve pain and anxiety in a significant portion of our patients. This benefit must be balanced, however, against the risk of adverse effects in a small but not insignificant portion of our patients.

## Intramuscular Thiamine

The "coma cocktail" has traditionally included dextrose, naloxone and thiamine. Intravenous dextrose corrects hypoglycemia. Naloxone reverses respiratory depression from narcotic overdose. Thiamine (vitamin B1) is necessary for the metabolism of glucose. Its absence can cause a rare condition known as Wernicke's encephalopathy. Signs and symptoms include unsteady gait and confusion.

## BENEFITS AND ADVANTAGES

Administration of thiamine is a critical part of the treatment of Wernicke's encephalopathy. It is inexpensive (approximately 1 dol-

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lar per dose), easily administered and rarely causes allergic reactions.

## RISKS AND DRAWBACKS

Wernicke's encephalopathy is quite rare. It is frequently associated with malnutrition and alcoholism. 100 mg of thiamine is unlikely to be an effective treatment because of the very large thiamine deficits typically associated with this condition (1000 mg or more). It is not even clear that administration of dextrose can precipitate Wernicke's encephalopathy, contrary to time-honored precepts.<sup>14</sup>

According to traditional teaching, thiamine should always be administered before dextrose. This does not make sense, however, when one considers that thiamine absorption is much slower than dextrose absorption. This is true of both intramuscular and intravenous thiamine administration.

Additionally, the use of thiamine provides one more needle that can potentially injure an EMS provider. Since this drug is so rarely needed, it is likely to be another medication that will expire before it is used.

## SUMMARY

Although thiamine is unlikely to benefit an EMS patient, it is also unlikely to harm that patient. It is inexpensive, but creates the possibility of another needlestick and another medication that will expire before it is used.

## Intramuscular Glucagon

Glucagon is a naturally occurring hormone that increases blood sugar levels by breaking down glucose stores (glycogen) into glucose.

## BENEFITS AND ADVANTAGES

The principal benefit of glucagon is its ability to raise the blood sugar when providers cannot start an IV and administer intravenous dextrose. It can be administered intramuscularly or subcutaneously.

## RISKS AND DRAWBACKS

Although glucagon usually works, it depends on the presence of sufficient glycogen stores. This means that patients who are severely malnourished are less likely to respond. Glucagon frequently causes nausea and vomiting, which can be quite severe. Because the liquid form of the drug is not stable, the EMT-I must mix it immediately before administering it. This requires another needle and increases the risk of a needlestick.

Glucagon is very reliable, but its effects take longer than intravenous dextrose, so intravenous dextrose is still the treatment of choice for a patient who is hypoglycemic. It is not cheap (approximately \$75.00 per dose) and if it is not used before its expiration date, it must be discarded.

## SUMMARY

Although intravenous dextrose is the treatment of choice for hypoglycemia, glucagon is a very good alternative treatment when intravenous access is not possible. It is expensive and must be mixed before use.

## Broselow® or Similar Tape

The Broselow® tape is similar to the measuring tape a tailor uses. In this case, though, the tape is wider and has a good deal of information printed on it. The provider lays it alongside the supine child. This allows the provider to determine the child's height, approximate weight, and dosages of common resuscitation medications.

## BENEFITS AND ADVANTAGES

The primary benefit of the Broselow® tape is that it can allow ED staff to prepare medications and equipment before EMS arrival at the hospital with a critically injured or ill child.

## RISKS AND DRAWBACKS

A package of five Broselow® tapes costs \$120. As long as use of the tape does not distract EMS providers from patient care, it should have virtually no effect on pre-hospital care.

## SUMMARY

The Broselow tape can assist emergency department staff in preparing for EMS arrival with a critically ill or injured child.

## Interventions Likely to Be Excluded

The district medical advisors felt that a number of interventions (listed in the accompanying box) were not appropriate for the Vermont EMT-Intermediate curriculum. Reasons for this, although not always discussed specifically, probably include factors such as infrequency of use, expense, difficulty or impossibility of finding clinical sites for initial education, the length of the training, the small number of EMTs anticipated to have the time for the course and difficulty in maintenance of skills.

## INTERVENTIONS LIKELY TO BE EXCLUDED

- Advanced cardiac life support (ACLS) assessments and medications:
  - ECG rhythm interpretation
  - 12 lead ECGs
  - epinephrine 1:10,000
  - atropine
  - lidocaine 2%
  - transcutaneous pacing
- endotracheal intubation (adult and pediatric)
- controlled substances (morphine sulfate and diazepam)
- needle chest decompression
- furosemide
- adenosine
- evaluation of heart tones
- replacement of tracheostomy tube in stoma
- automated transport ventilators
- intubation of stoma (pedi)
- suctioning of meconium in newborns
- intraosseous (IO) infusion
- extubation
- insertion of nasogastric and orogastric tubes
- medication administration by rectal route

## Challenges & Next Steps

Once the content of the curriculum is determined, we will have a number of challenges. There will need to be a transition course for existing EMT-Intermediates. Since most instructor-coordinators of EMT-I courses are EMT-Is themselves and have little or no familiarity with the new interventions, they will need to be the first ones to go through the transition course. Practical instructors, clinical preceptors and licensed services must also become familiar with changes in the curriculum and scope of practice. Another challenge in instituting this educational level is the need to update and expand agreements with hospitals to provide greater clinical exposure and supervision to students. The question of whether there should be a field internship component to this education has not been answered yet.

The expanded scope of the curriculum has implications for licensed EMS agencies, as well. An easy problem to solve is the need for a larger IV kit or drug box. Another is the expense of these new medications and devices, some of which will be used rarely or not at all. Perhaps the largest challenge for services is that of maintaining their stock of these medications. The most common violation found on annual scheduled ambulance inspections is expired medications. This happens even though currently there are only three medications the EMT-I can administer

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and the inspections are scheduled beforehand. Services will have to become more vigilant when the number of medications they stock increases from three to eight.

The EMS office is continuing discussions with district medical advisors and other officials. Since the process of curriculum revision is necessarily time-consuming, members of the EMS community will have plenty of time to learn about and participate in discussions about these changes before they are implemented. The EMS Office is committed to keeping the community informed.

— Mike O'Keefe  
State Training Coordinator

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